

Lab 5 Introduction

UART Initialization and Programming

Lab 5

Example: key pressed and character sent from PuTTY on PC through its UART

Example: character received on CyBot through TM4C microcontroller UART

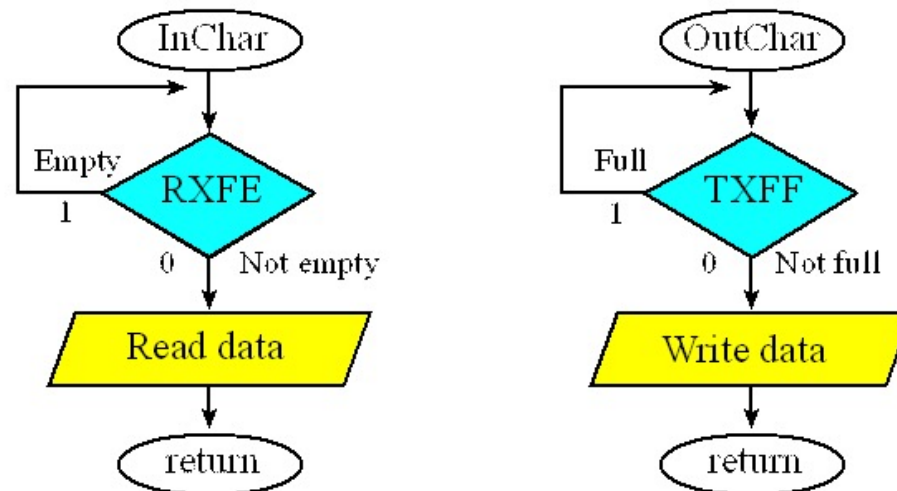
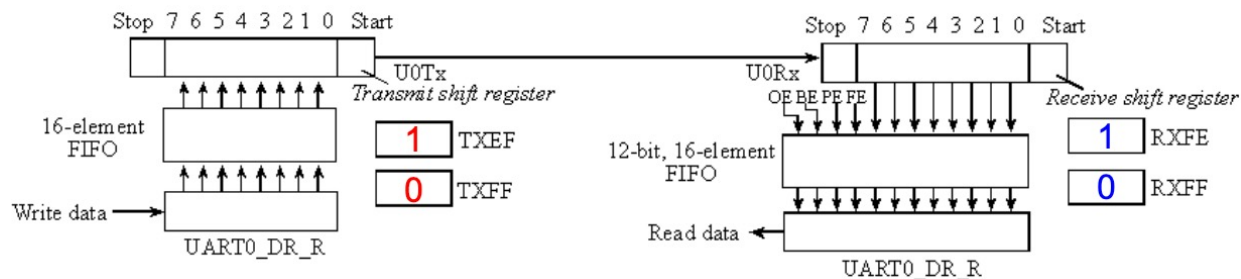


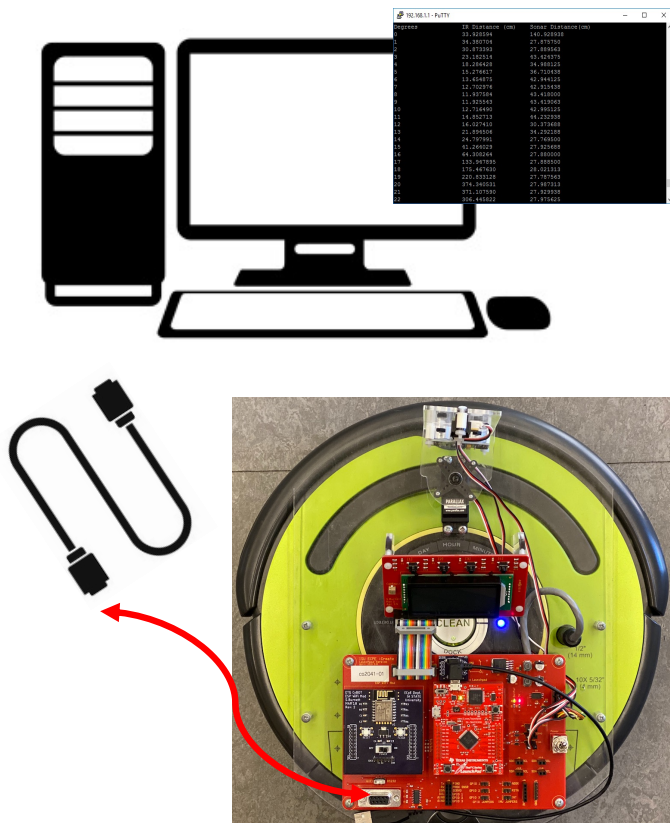
Figure 11.8. Flowcharts of InChar and OutChar using busy-wait synchronization.

Interactive tool and figure from VYES textbook

Lab 5 Functionality

- Send and receive data between the CyBot and PC using your own code for initialization of the UART interface
 - First half of the initialization (GPIO alternate function for UART)
 - Second half of the initialization (UART configuration)
- Write your own UART send and receive functions using the polling (busy-wait) method of I/O
- Implement round-trip communication between the CyBot and PuTTY using your own code

Background: UART Code in Labs 3 and 4



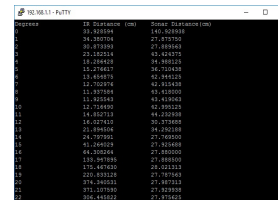
Code provided in pre-compiled library

- `cyBot_uart.h`
- `libcybotUART.lib`

```
void cyBot_uart_init(void);  
void cyBot_sendByte(char data);  
int cyBot_getByte(void);
```

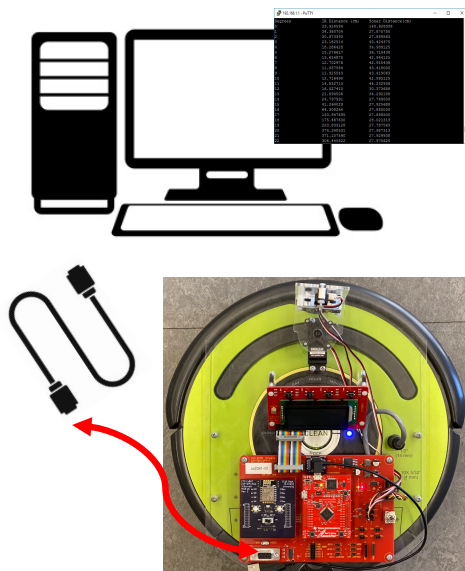
`cyBot_uart_init()`

`cyBot_sendByte()`



`cyBot_getByte()`

Background: UART Code in Lab 5 – Part 1



NEW pre-compiled library

- `cyBot_uart.h`
- `libcybotUART.lib`

```
void cyBot_uart_init(void);  
void cyBot_uart_init_clean(void);  
void cyBot_uart_init_PHJ_first_half(void);  
void cyBot_uart_init_last_half(void);  
void cyBot_sendByte(char data);  
char cyBot_getByte_blocking(void);
```

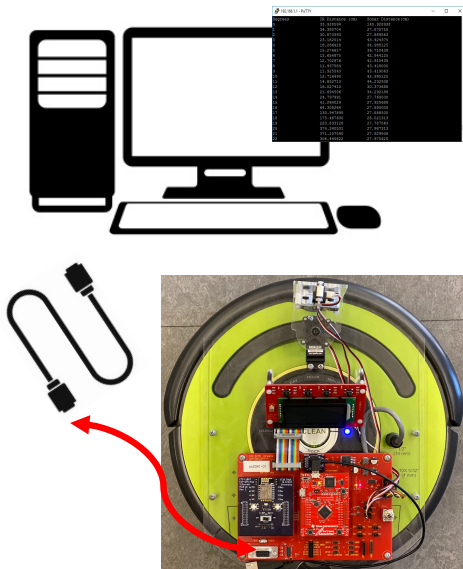
`cyBot_sendByte()`



```
cyBot_uart_init_clean()  
//YOUR OWN CODE FOR GPIO INIT (see lab5_template.c)  
cyBot_uart_init_last_half()
```

`cyBot_getByte_blocking()`

Background: UART Code in Lab 5 – Part 2



Your own code

- `uart.h`
- `uart.c`

Suggestion: Incrementally
replace library functions
with your own code.

```
void uart_init(void);  
void uart_sendChar(char data);  
char uart_receive(void);  
void uart_sendStr(const char *data);
```

`uart_sendChar()`



`uart_receive()`



`uart_init ()` (see `uart.c` for partial code)